REMARKS

Applicants have studied the Office Action dated October 2, 2002 and have made amendments to the claims. It is submitted that the application, as amended, is in condition for allowance. By virtue of this amendment, claims 1-20 are pending. Claims 1, 5-7, 9, and 11-13 have been amended, and new claims 14-20 have been added. Reconsideration and allowance of the pending claims in view of the above amendments and the following remarks are respectfully requested.

The disclosure was objected to because of an "informality". The specification has been amended to include the serial number of the related application as requested by the Examiner. No new matter has been added. It is submitted that the specification now fulfills all of the requirements of 35 U.S.C. § 112. Therefore, it is respectfully submitted that the objection to the disclosure should be withdrawn.

Claims 1-6 and 9-13 were rejected under 35 U.S.C. § 102(b) as being anticipated by Saeki et al. (U.S. Patent No. 4,946,633). Claims 1, 2, 6, 9, 10, and 13 were rejected under 35 U.S.C. § 102(b) as being anticipated by Matumoto et al. (U.S. Patent No. 5,052,907) or Nakamura (Japanese Patent No. 62-221523). Claims 1, 2, 6, 9, 10, and 13 were rejected under 35 U.S.C. § 102(e) as being anticipated by Briar et al. (U.S. Patent No. 6,355,199). These rejections are respectfully traversed.

The present invention is directed to methods and molds for injection molding an encapsulation material to encapsulate an integrated circuit chip. One preferred embodiment of the present invention provides an injection mold for injection molding an encapsulation material to encapsulate at least one integrated circuit chip. The injection mold includes at least two parts that define an injection circuit formed between the two parts, and at least one blind complementary channel formed between the two parts and in at least one of the parts. The injection circuit includes at least one injection cavity for housing the chip, at least one transfer

chamber from which the encapsulation material is injected, and at least one injection channel formed in a parting line of the mold.

The injection channel connects the transfer chamber to the injection cavity. Additionally, the blind complementary channel directly communicates with the injection channel at some distance from the injection cavity and the transfer chamber so as to cause the formation of at least one appendage of encapsulation material that is connected to the encapsulation material that fills the injection channel. Because of this formation of the appendage, if flash is formed between the two parts of the mold in its parting line, then after demolding such flash stays attached to the encapsulation material that filled the injection channel and the blind complementary channel (i.e., the appendage). Therefore, when handling the resulting molded part, the flash is retained and does not break up.

The Saeki, Matumoto, Nakamura, and Briar references also disclose methods and devices for producing molded integrated circuits. However, none of Saeki, Matumoto, Nakamura, and Briar discloses an injection mold that includes at least one injection cavity, at least one transfer chamber, at least one injection channel formed in a parting line or plane of the mold and connecting the transfer chamber to the injection cavity, and at least one blind complementary channel formed between two parts of the mold and in at least one of the parts, with the blind complementary channel directly communicating with the injection channel at some distance from the injection cavity and the transfer chamber so as to cause the formation of at least one appendage of encapsulation material that is connected to the encapsulation material that fills the injection channel, as is recited in amended claim 1.

Likewise, none of Saeki, Matumoto, Nakamura, and Briar discloses a method for injection molding in which a leadframe is placed in an injection mold having at least one injection cavity, at least one transfer chamber, and at least one injection channel formed in a parting line or plane of the mold and connecting the transfer chamber to the injection cavity, liquid encapsulation material is injected into the injection cavity so as to fill the cavity and at least one blind complementary channel that is formed between the two parts of the mold and in at least one of the parts and that directly communicates with the injection channel at some distance from the injection cavity and the transfer chamber, and the liquid encapsulation material is

hardened so as to form a molded part that includes an integrated circuit package and at least one complementary branch of encapsulation material that corresponds to the at least one blind complementary channel, as is recited in amended claim 9.

Saeki, Matumoto, and Nakamura all disclose transfer chambers, injection cavities, and injection channels formed between two parts of a mold. Saeki further discloses a channel connecting two transfer chambers (Figs. 1A, 7, 10, and 13), and a channel connecting one injection cavity to a dummy cavity (Fig. 13). Matumoto further discloses a channel connecting the injection channel to a recess (Fig. 6). Nakamura further discloses the injection channel having a blind-alley-shaped branch (Fig. 1). Thus, these references only disclose channels that are specially designed and exclusively used for carrying the encapsulation material to encapsulate the integrated circuit chip.

In contrast, in preferred embodiments of the present invention, the mold includes an injection channel formed in a parting line or plane of the mold and connecting the transfer chamber to the injection cavity, and at least one blind complementary channel formed between two parts of the mold and in at least one of the parts, with the blind complementary channel directly communicating with the injection channel at some distance from the injection cavity and the transfer chamber so as to cause the formation of at least one appendage of encapsulation material that is connected to the encapsulation material that fills the injection channel, so that if during injection molding flash is formed between the two parts of the mold in its parting line or plane, then after demolding such flash stays attached to at least the encapsulation material that filled the injection channel and the blind complementary channel. Thus, the blind complementary channel is connected to the injection channel at some distance from the injection cavity and the transfer chamber, and operates to form complementary attachment means for flash that is formed during injection molding. The blind complementary channel has no function in carrying the encapsulation material into the injection cavity to encapsulate the integrated circuit chip.

Briar discloses a mold having channels for forming stiffeners on a flexible tape. The encapsulation material cannot go between the two parts of the mold. If material seeps between one part of the mold and the tape along the stiffener, the seepage stays attached to the tape. Thus,

there is not formed any complementary attachment means for flash that is formed between two parts of a mold in its parting line or plane during injection molding. In contrast, in preferred embodiments of the present invention, the blind complementary channel is connected to the injection channel at some distance from the injection cavity and the transfer chamber, and operates to form complementary attachment means for flash that is formed during injection molding.

Applicants believe that the differences between Saeki, Matumoto, Nakamura, Briar, and the present invention are clear in amended claims 1 and 9, which set forth an injection mold and a method for injection molding according to embodiments of the present invention. Therefore, claims 1 and 9 distinguish over the Saeki, Matumoto, Nakamura, and Briar references, and the rejections of these claims under 35 U.S.C. § 102(b) and 35 U.S.C. § 102(e) should be withdrawn.

As discussed above, claims 1 and 9 distinguish over the Saeki, Matumoto, Nakamura, and Briar references, and thus, claims 2-6 and claims 10-13 (which depend from claim 1 and 9, respectively) also distinguish over the Saeki, Matumoto, Nakamura, and Briar references. Therefore, it is respectfully submitted that the rejections of claims 1-6 and 9-13 under 35 U.S.C. § 102(b) and 35 U.S.C. § 102(e) should be withdrawn.

Applicants thank the Examiner for indicating that claims 7 and 8 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. Claim 7 has been rewritten in independent form, and claim 8 depends from claim 7. Accordingly, it is respectfully submitted that claims 7 and 8 are now in condition for allowance.

Claims 14-20 have been added by this amendment, and are provided to further define the invention disclosed in the specification. Claims 14-20 are allowable for at least the reasons set forth above with respect to claims 1-13.

Applicants have examined the references cited by the Examiner as pertinent but not relied upon. It is believed that these references neither disclose nor make obvious the invention recited

in the present claims. In view of the foregoing, it is respectfully submitted that the application and the claims are in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is invited to call the undersigned attorney at (561) 989-9811 should the Examiner believe a telephone interview would advance the prosecution of the application.

Respectfully submitted,

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APPENDIX

IN THE SPECIFICATION:

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Additionally, this application is related to the application "INJECTION MOLD FOR AN OPTICAL SEMICONDUCTOR PACKAGE AND CORRESPONDING OPTICAL SEMICONDUCTOR PACKAGE," Serial No. [_____] 09/862,984, now _____, which was filed on the same day as the present application and commonly assigned herewith to STMicroelectronics S.A. This related application is herein incorporated by reference.

IN THE CLAIMS:

1. (Amended) An injection mold for injection molding an encapsulation material to encapsulate at least one integrated circuit chip, said injection mold comprising:

at least two parts that define at least one injection circuit formed between the two parts and in at least one of the parts, the injection circuit including:

at least one injection cavity for housing the chip;

at least one transfer chamber from which the encapsulation material is injected; and

at least one injection channel formed in a parting line or plane of the mold, the at least one injection channel connecting the transfer chamber to the injection cavity; and

at least one blind complementary channel formed between the two parts of the mold and in at least one of the parts, the blind complementary channel directly communicating with the injection [circuit,] channel at some distance from the injection cavity and the transfer chamber such that the blind complementary channel [being formed between the two parts of the mold and forming] causes the formation of at least one appendage of encapsulation material that is connected to the encapsulation material that fills the injection [circuit] channel, so that if during injection molding flash is formed between the two parts of the mold in its parting line or plane,

then after demolding such flash stays attached to at least the encapsulation material that filled the injection channel and the blind complementary channel.

5. (Amended) The injection mold according to claim 1, wherein the complementary channel [extends from] also directly communicates with the transfer chamber.

6. (Amended) The injection mold according to claim 1, wherein the at least one blind complementary channel [extends from] also directly communicates with the injection cavity.

7. (Amended) [The] An injection mold [according to claim 1, further] for injection molding an encapsulation material to encapsulate at least one integrated circuit chip, said injection mold comprising:

at least two parts that define at least one injection circuit, the injection circuit including:

at least one injection cavity for housing the chip;

at least one transfer chamber from which the encapsulation material is injected; and

at least one injection channel connecting the transfer chamber to the injection cavity;

at least one blind complementary channel communicating with the injection circuit, the blind complementary channel being formed between the two parts of the mold and forming at least one appendage of encapsulation material that is connected to the encapsulation material that fills the injection circuit; and

an insert having one face that partly constitutes the wall of the injection cavity,

wherein the complementary channel extends around the insert so as to form an annular space communicating with the injection cavity.

9. (Amended) A method for injection molding an encapsulation material to encapsulate at least one integrated circuit chip, said method comprising the steps of:

placing a leadframe supporting the chip in an injection mold having at least one injection circuit formed between two parts of the mold and in at least one of the parts, the injection circuit including [that includes] at least one injection cavity for housing the chip, at least one transfer chamber from which liquid encapsulation material is injected, and at least one injection channel formed in a parting line or plane of the mold and connecting the transfer chamber to the injection cavity;

injecting the liquid encapsulation material into the injection cavity via the injection channel so that the liquid encapsulation material fills the cavity and at least one blind complementary channel of the injection mold, the blind complementary channel formed between the two parts of the mold and in at least one of the parts, and directly communicating with the injection [circuit] channel at some distance from the injection cavity and the transfer chamber; and

hardening the liquid encapsulation material so as to form a molded part that includes an integrated circuit package corresponding to the injection cavity and at least one complementary branch of encapsulation material corresponding to the at least one blind complementary channel, the complementary branch of encapsulation material being connected to the hardened encapsulation material filling the injection [circuit] channel so that if flash was formed between the two parts of the mold in its parting line or plane, then after demolding such flash stays attached to at least the encapsulation material that filled the injection channel and the complementary branch of encapsulation material.

11. (Amended) The method according to claim 9, wherein the complementary channel connects two injection channels of the mold, the two injection channels being connected to the same transfer chamber.

12. (Amended) The method according to claim 9, wherein the complementary channel [extends from] also directly communicates with the transfer chamber.

13. (Amended) The method according to claim 9, wherein the complementary channel [extends from] <u>also directly communicates with</u> the injection cavity.